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NASA/SP—1999-7011/SUPPL483  
January 25, 1999

# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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	Includes exobiology; planetary biology; and extraterrestrial life.	

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# Typical Report Citation and Abstract

① 19970001126 NASA Langley Research Center, Hampton, VA USA  
② Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes  
③ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;  
④ Mar. 1996; 130p; In English  
⑤ Contracts/Grants: RTOP 505-68-70-04  
⑥ Report No.: NASA/TM-1996-17418; No Copyright; Avail: CASI; A07, Handcopy; A02, Microfiche  
⑦ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 50°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.  
⑧ Author  
⑨ Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations

## Key

1. Document ID Number, Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s), Availability and Price Codes
7. Abstract
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9. Subject Terms

# AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 483)

JANUARY 25, 1999

## 51 LIFE SCIENCES (GENERAL)

10000004 NASA Marshall Space Flight Center, Huntsville, AL USA

Media Compositions for Three-Dimensional Mammalian Tissue Growth under Microgravity Culture Conditions

Goodwin, Thomas J., Inventor, NASA Marshall Space Flight Center, USA; Dec. 08, 1998; 14p; In English

Patent Info.: Filed 13 Feb. 1996; NASA-Case-MSC-21984-2; US-Patent-5,846,807; US-Patent-Appl-SN-600793; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Normal mammalian tissue and the culturing process has been developed for the three groups of organ, structural and blood tissue. The cells are grown *in vitro* under microgravity culture conditions and form three dimensional cells aggregates with normal cell function. The microgravity culture conditions may be microgravity or simulated microgravity created in a horizontal rotating wall culture vessel.

Official Gazette of the U.S. Patent and Trademark Office

*Tissues (Biology); Mammals; Microgravity; Procedures*

## 52 AEROSPACE MEDICINE

*Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.*

10000005 NASA Langley Research Center, Hampton, VA USA

Digital Mammography with a Mosaic of CCD Arrays

Jafink, Antony, Jr., Inventor, NASA Langley Research Center, USA; McAdoo, James A., Inventor, NASA Langley Research Center, USA; Dec. 01, 1998; 11p; In English

Patent Info.: Filed 26 Jan. 1996; NASA-Case-LAR-15059-1; US-Patent-5,844,242; US-Patent-Appl-SN-601143; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

A digital mammography device uses a mosaic of electronic digital imaging arrays to scan an x-ray image is discussed. The mosaic of arrays is repositioned several times to expose different portions of the image, until the entire image is scanned. The data generated by the arrays during each exposure is stored in a computer. After the final exposure, the computer combines data of the several partial images to produce a composite of the original x-ray image. An aperture plate is used to reduce scatter and the overall exposure of the patient to x-rays.

Official Gazette of the U.S. Patent and Trademark Office

*Medical Equipment; X Ray Imagery; Imaging Techniques; Image Processing; Radiography; Biotechnology*

1000000644 Army Research Inst. of Environmental Medicine, Natick, MA USA

Effects of Exercise-Heat Stress While Wearing Five Toxic Agent Protective Systems

Cadarette, B. S., Army Research Inst. of Environmental Medicine, USA; Levine, L., Army Research Inst. of Environmental Medicine, USA; Staab, J. E., Army Research Inst. of Environmental Medicine, USA; Kolka, M. A., Army Research Inst. of Environmental Medicine, USA; Sawka, M. N., Army Research Inst. of Environmental Medicine, USA; Apr. 1998; 73p; In English  
Report No.(s): AD-A355167; USARIEM-T98-19; No Copyright; Avail: CASI, A94, Hardcopy, A91, Microfiche

This study evaluated heat strain in four developmental toxic agent protective systems relative to the standard Toxic Agent Protective (TAP) suit during exercise-heat stress. Eight subjects (6M, 2F) completed five experiments in a 38 deg C, 30% rh climate, wearing: (1) Self Contained Toxic Agent Protective Outfit (STEPO) with rebreather (STEPO-R); (2) STEPO

with tether (STEPO-T); (3) Improved Toxicological Agent Protective (ITAP) suit with Self-Contained Breathing Apparatus (ITAP-SCBA); (4) ITAP with blower (ITAP-B); and (5) TAP. Experiments were treadmill walking at 0.89 m sec<sup>-1</sup>, 0% grade, exercise/rest cycles of 20/10 min, for 240 min in STEPO and 120 min in ITAP. Mean metabolic rates were: (1) STEPO-R, 2984±26 W; (2) STEPO-T, 2994±34 W; (3) ITAP-SCBA, 2754±26 W; (4) ITAP-B, 2554±27 W; and (5) TAP, 2224±40 W. In STEPO, subjects received whole body cooling at: STEPO-R, 2004±36 W; and STEPO-T, 1864±59 W. In ITAP, subjects received shirt only cooling at: ITAP-SCBA 1724±34 W; and ITAP-B, 1784±41 W. TAP had no cooling. Comparisons were not made between STEPO and ITAP systems. Exposure time was longer ( $p < 0.03$ ) in STEPO-R (834±22 min) and STEPO-T (1064±39 min) than in TAP (464±10 min). Exposure time was longer ( $p < 0.05$ ) in ITAP-SCBA (854±20 min) and ITAP-B (874±25 min) than in TAP (464±10 min). Rate of heat storage (S) was less ( $p < 0.05$ ) in STEPO-R (374±8 W m<sup>-2</sup>) and STEPO-T (384±12 W m<sup>-2</sup>) than in TAP (774±15 W m<sup>-2</sup>). S was less ( $p < 0.05$ ) in ITAP-SCBA (514±16 W m<sup>-2</sup>) than in TAP (774±15 W m<sup>-2</sup>). Microclimate cooling significantly reduced S in three of four systems and increased exposure time in all four systems relative to TAP.

#### DTIC

*Toxicity; Breathing Apparatus; Evaluation; Protection; Physical Exercise; Heat Tolerance; Temperature Effects*

10900000072 NASA Langley Research Center, Hampton, VA USA

Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 481

Dec. 28, 1998, 28p, In English

Report No.(s): NASA/SP-1998-7011/SUPPL481; NAS 1.21:7011/SUPPL481; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report lists reports, articles and other documents recently announced in the NASA STI Database.

#### Author

*Aerospace Medicine; Bibliographies; Data Bases*

109000000794 Kyushu Univ., Inst. of Advanced Material Study, Kasuga, Japan

Noncontact Measurement of Internal Temperature Distribution using Ultrasonic Computed Tomography, Report 2, Numerical Simulation and Experimental Measurement

Fujii, Motoo, Kyushu Univ., Japan; Zhang, Xing, Kyushu Univ., Japan; Kumamori, Tooru, Kyushu Univ., Japan; The Reports of Institute of Advanced Material Study, Kyushu University; 1994, ISSN 0914-3793, Volume 8, No. 1, pp. 131-139; In Japanese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

A numerical simulation and experiments are carried out for a noncontact method to measure internal temperature distribution of a solid using ultrasonic computed tomography (CT). The method is based on the fact that the sound velocity in a material depends on its temperature. 'Filtered Back Projection' is found to be the most effective algorithm for the reconstruction. To obtain an accurate temperature distribution, it is necessary to measure the sound propagation time with high resolution such as 1 ns. In the experiment, the temperature distributions are measured in a concentric cylinder with 40 mm outer diameter which is made of agar-gel and heated along center line with 0.1 mm dia. platinum wire heater. It is confirmed that the method could measure the temperature distribution inside the agar-gel within an error of 0.1°C, except for the region very close to the platinum wire.

#### Author

*Temperature Measurement; Ultrasonics; Tomography*

## 63

### BEHAVIORAL SCIENCES

*Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research*

109000000502 Defence Science and Technology Organisation, Electronics and Surveillance Research Lab., Salisbury, Australia  
Psychological Approaches to Data Visualisation

Lee, Michael D., Defence Science and Technology Organisation, Australia; Vickers, Douglas, Adelaide Univ., Australia; Jul. 1998, 53p, In English

Report No.(s): DSTO-RR-0135, DODA-AR-010-587; Copyright; Avail: Issuing Activity (DSTO Electronics and Surveillance Research Lab., PO Box 1500, Salisbury, South Australia 5108), Hardcopy, Microfiche

The aim of 'data visualisation' is to display a body of information in a way which allows accurate and effortless human comprehension and analysis. Accordingly, the development of data visualisation techniques should be constrained by an understanding of both human perception and cognition. This report develops and examines a psychological framework for the development

of data visualisation techniques based on the notion of similarity structure modelling. Through a series of case studies, a range of established approaches to data visualisation is reviewed and evaluated within this framework, and a number of suggestions for the development of new techniques is made.

Author

*Psychology, Cognition, Scientific Visualization, Information Systems, Information Management*

199000000036 Old Dominion Univ., Psychology Dept., Norfolk, VA USA

Automation Technology and Human Performance: Current Research and Trends. Final Report, 1 Jan. - 31 Aug. 1998. Scerbo, Mark W., Editor, Old Dominion Univ., USA; Mouloua, Mustapha, Editor, University of Central Florida, USA; Jan. 1998; ISBN 0-8058-3135-5, 351p. In English; 3rd; Automation Technology and Human performance, 25-28 Mar. 1998, Norfolk, VA, USA

Contract(s)/Grant(s): N00014-98-1-0196

Report No.(s): AD-A354935; No Copyright; Avail: CASI; A16, Hardcopy; A03, Microfiche

The implementation of complex, and "intelligent" automated devices and machines in such domains as aviation, medicine, driving, and nuclear power has brought in its wake significant new challenges for those who work in human factors, cognitive science, and systems engineering. Recognizing the need for a better understanding of human interaction with complex and automated systems, The Third Automation Technology and Human Performance Conference was held in Norfolk, VA, in March 1998. The purpose of this meeting was to address both basic and applied research issues regarding automation technology across a variety of domains. The present report constitutes the proceedings from that meeting and includes sections human interaction with automated technology, driving systems and driver performance, air traffic control, adaptive automation, situation awareness, monitoring and vigilance, workload and fatigue, simulation technology, design and interface issues, and several others. It is expected that innovative experimental research and design standards presented in this report will play an important role in the development of future Naval systems.

DTIC

*Automatic Control, Human Performance, Human Factors Engineering, Trends, Systems Engineering, Psychophysiology*

199000000037 Nagoya Inst. of Tech., Japan

The Stress-Reducing Effect of "Cooperativeness" as a Personality Trait

Sumi, Katsunori, Nagoya Inst. of Tech., Japan; Matsumaga, Takuma, Nagoya Inst. of Tech., Japan; Bulletin of Nagoya Institute of Technology; 1992; ISSN 0918-595X; Volume 44, pp. 211-216; In Japanese; Copyright; Avail: Issuing Activity; Hardcopy; Microfiche

In this study the "stress reducing effect" of a personality trait on the stress process is investigated. A "stress-reducing effect" is composed of a "stress-buffering effect" and a "stress-suppressing effect". The former is the effect which focuses interest on the up to now, and which relieve stress as a result of a buffering of the influence of the stressor, the latter is the effect which prevents occurrence the stressor from the environment. On balance, this effect suppresses stress. A questionnaire was conducted with 155 college students as subjects. Life dissatisfaction factors as stressor were measured by five original items, and a scale of depression was used to rate stress. In a Y-G personality inventory, the "lack of cooperativeness" scale consisted of ten items, which asserted that the personality trait measured by these items conformed exactly to "basic interpersonal trust". As a result, the hypothesized correlation of stressor or "cooperativeness" with stress, and the stress-suppressing effect of cooperativeness is demonstrated. Contrary to prediction, interaction between stressor and "cooperativeness", that is, the stress-buffering effect of "cooperativeness" was not found. Implications of the results and future research issues are discussed.

Author

*Stress Relieving, Personality, Cooperation*

199000000038 Nagoya Inst. of Tech., Japan

An Experimental Study on Psychological Time, Report 13, The Effects of Tasks Interposed During the Foreperiod on Reaction Time and Time Estimation

Kohmura, Kazumi, Nagoya Inst. of Tech., Japan; Bulletin of Nagoya Institute of Technology; 1992; ISSN 0918-595X; Volume 44, pp. 11-18; In Japanese; Copyright; Avail: Issuing Activity; Hardcopy; Microfiche

Two experiments were conducted to investigate the relation between reaction time (RT) and estimated time (ET), as continued from previous study. RT was measured by pressing a key swiftly for a light spot presented after short interval that was called foreperiod. ET was measured by the method of reproduction in remembering the duration of foreperiod used to measure RT. Correlation coefficients between RT and ET were examined in order to explore the mechanism of time estimation. Experiments were done in the unexpected situation, in which subjects were given no information about the foreperiod, and in the expectant situation, in

which they were given orally information about it by experimenter. In addition to these conditions, the task was interposed in order to delay RT in present study. It was counting in the reverse order a two- or four-digit number which was given orally by experimenter. Main results were as follows: (1) RT obtained in the expectant situation was slightly shorter than that in the unexpected situation. But RT showed little difference in comparing between task conditions interposed during the foreperiod; (2) ET in both situations were longer than the . . . . . period duration (standard time), and ET obtained in the expectant situation was longer than that in the unexpected situation. However, it seemed difficult to compare ET obtained in both situations each other, because subjects might have used the different method of time estimation in each situation. The relative values (ms %) of ET for each foreperiod showed little difference between the foreperiod of 12 sec and 16 sec in both situations; and (3) Correlation coefficients between RT and ET in the expectant situation were recognized to be high in comparison with those in the unexpected situation. However, it was difficult to find out the specific relation between RT and ET, because positive and negative correlation coefficients were mixed together in individual data. These findings seem to reflect that the mechanism of time estimation are very complicated because subjects try to use every possible clues obtained from the experimental situation in estimating time.

#### Author

*Experimentation; Reaction Time; Estimating; Tasks; Human Reactions*

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### MAN SYSTEM TECHNOLOGY AND LIFE SUPPORT

*Includes human engineering, biotechnology, and space suits and protective clothing. For related information see also 16 Space Transportation*

19990009064 Defence Science and Technology Organisation, Electronics and Surveillance Lab., Salisbury, Australia

Psychological Approaches to Data Visualization

Lee, Michael D., Defence Science and Technology Organisation, Australia; Vickers, Douglas, Adelaide Univ., Australia; Jul. 1998, 67p; In English

Report No.(s): AD-A355765; DSTO-RR-0135; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The aim of data visualization is to display a body of information in a way which allows accurate and effortless human comprehension and analysis. Accordingly, the development of data visualization techniques should be constrained by an understanding of both human perception and cognition. This report develops and examines a psychological framework for the development of data visualization techniques based on the notion of similarity structure modelling. Through a series of case studies, a range of established approaches to data visualization is reviewed and evaluated within this framework, and a number of suggestions for the development of new techniques is made.

#### DTIC

*Scientific Visualization; Human Factors Engineering*

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project 0704-0188, Washington, DC 20503.</p>			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED	
	January 25, 1999	Special Publication	
4. TITLE AND SUBTITLE  Aerospace Medicine and Biology A Continuing Bibliography (Supplement 483)			5. FUNDING NUMBERS
6. AUTHOR(S)			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)  NASA Scientific and Technical Information Program Office			8. PERFORMING ORGANIZATION REPORT NUMBER  NASA/SP-1998-7011/Suppl483
9. SPONSORING MONITORING AGENCY NAME(S) AND ADDRESS(ES)  National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681			10. SPONSORING MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION AVAILABILITY STATEMENT  Subject Category: Availability: NASA CASI (301) 621-0390		Distribution:	12b. DISTRIBUTION CODE  Unclassified-Unlimited Subject Category - 52
13. ABSTRACT (Maximum 200 words)  This report lists reports, articles and other documents recently announced in the NASA STI Database.			
14. SUBJECT TERMS  Aerospace Medicine Bibliographies Biological Effects			15. NUMBER OF PAGES  20
			16. PRICE CODE  A03/HC
17. SECURITY CLASSIFICATION OF REPORT  Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE  Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

**END**